

Case 3041

Cynodon* Spix in Spix & Agassiz, 1829 and *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 (Osteichthyes, Characiformes): proposed conservation, and proposed designation of *C. gibbus* and *R. vulpinus* Spix & Agassiz, 1829 as the respective type species of *Cynodon* and *Rhaphiodon

M. Toledo-Piza

Seção de Peixes, Museu de Zoologia da Universidade de São Paulo, Caixa Postal 04694, São Paulo, SP 04299-970 Brazil (e-mail: mtpiza@usp.br)

K.J. Lazara

Department of Mathematics and Science, United States Merchant Marine Academy, Kings Point, New York 11024-1699, U.S.A. (e-mail: kzara@aol.com)

Abstract. The purpose of this application is to stabilize the usage of the names *Cynodon* Spix in Spix & Agassiz, 1829 and *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 for two genera of South American freshwater characoid fish (CYNODONTIDAE or CHARACIDAE, CYNODONTINAE). The early history of the names is complex and a number of interpretations have been put forward. It is proposed that *Cynodon gibbus* Spix & Agassiz, 1829 be designated the type species of *Cynodon*, that *R. vulpinus* Spix & Agassiz, 1829 be designated as the type species of *Rhaphiodon*, and that, if their type species are considered to be congeneric, *Rhaphiodon* be given precedence over *Cynodon*.

Keywords. Nomenclature; taxonomy; Osteichthyes; Characiformes; CYNODONTIDAE; CHARACIDAE; *Cynodon*; *Rhaphiodon*; *Cynodon gibbus*; *Cynodon vulpinus*; *Rhaphiodon gibbus*; *Rhaphiodon vulpinus*; freshwater fish; South America.

1. In 1829 Louis Agassiz completed the work on marine and freshwater Brazilian fishes begun by Johann Baptist von Spix, who died in 1826. The work was published in two parts, the first between 22 May and 4 July 1829, and the second in January 1831 (see Whitehead & Myers, 1971 and Kottelat, 1988). During the 1817-1820 zoological and botanical expedition to Brazil, Spix was responsible for the collection of fish specimens and supervised most of the drawings; in part I a number of plates bear generic and specific names assigned by him. Agassiz wrote the whole of the text; he did not always adopt Spix's names which were on the plates and in the text provided replacement names of his own. The names used in the text and plates of the second part are the same, having been assigned by Agassiz after Spix's death. The specimens collected by Spix (except those later given to Agassiz) were housed in the Zoologische Staatssammlung in Munich until destroyed in April 1944 by bombing; those of several species described by Agassiz are housed in the Musée d'Histoire Naturelle de Neuchâtel (see Kottelat, 1988).

2. The second edition of Cuvier's *Règne animal*, which included descriptions of several new fish taxa, appeared not later than 31 March 1829 (see Boeseman, 1962, p. 80), and thus has two to three months priority over the first part of Spix & Agassiz's (1829) work (see also Whitehead & Myers, 1971 and Kottelat, 1988). Cuvier had seen Spix's unpublished plates and used several of Spix's names, either as valid names or in synonymy.

3. Agassiz (Spix & Agassiz, 1829, pp. 59, 76) provided the description of the genus *Rhaphiodon* and included two nominal species, *R. vulpinus* and *R. gibbus*, for which he also provided descriptions (pp. 76–78). The plates by Spix that accompanied the descriptions were labeled *Cynodon vulpinus* (pl. xxvi) and *Cynodon gibbus* (pl. xxvii). The name *Cynodon* is attributed to Spix in the text by Agassiz (p. 76), and is there treated as a synonym of his own name *Rhaphiodon*; *Cynodon* is available from Spix's plates under Article 12.2.7 of the Code. Agassiz (1829, p. 76, footnote) justified the establishment of his replacement name *Rhaphiodon* for Spix's *Cynodon* because the name *Cynodon* had already been used in botany.

4. Before the publication of Spix & Agassiz (1829) Cuvier (1829, before 31 March) had introduced the generic name *Cynodon* in conjunction with the description of the genus *Hydrocyon*. Footnote no. 4 in Cuvier (p. 312) stated [with Cuvier's bibliographic abbreviations and punctuation unaltered]: 'Autre espèce du Brésil *Hydroc. scomberoides*, Cuv., Mém. Mus., V, pl. xxvii, f. 2, ou *Cynodon vulpinus*, Spix, xxvi; — *Cynodon gibbus*, id., xxvii'. The Spix plates cited in combination with the species names *vulpinus* and *gibbus* had not, however, been published at that time. In Opinion 1581 (March 1990) *Hydrocyon scomberoides* Cuvier, 1819 was confirmed as the type species of *Hydrolycus* Müller & Troschel, 1844, but the status of the names *Cynodon* and *C. vulpinus* was not then considered.

5. Whitehead & Myers (1971, p. 489) reproduced Cuvier's above footnote, but its significance has been ignored by authors (see para. 6 below) who have addressed the status of *Cynodon* and *Rhaphiodon*. Whitehead & Myers provided generalized instructions (pp. 494–495) on how to solve the nomenclatural problems arising from the works of Cuvier (1829) and Spix & Agassiz (1829), and Weitzman (1996) recommended that these matters be referred to the Commission.

6. Authors such as Campos (1945), Travassos (1946), Kottelat (1988), Eschmeyer (1990, 1998), Eschmeyer & Bailey (1990) and Géry, Le Bail & Keith (1999) have arrived at different conclusions regarding *Cynodon* and *Rhaphiodon*, and in some cases additional generic names have been established for species associated with these genera, for example *Rhaphiodontichthys* Campos, 1945 (p. 473; type species *Cynodon vulpinus*) and *Camposichthys* Travassos, 1946 (p. 132; type species *Cynodon gibbus*). The latter names have seldom been adopted (see Mago-Leccia, 1970, p. 30 and Machado-Allison, 1987, p. 134 for usage of *Rhaphiodontichthys*).

7. The species denoted by the names *vulpinus* and *gibbus* have been considered congeneric by some authors and placed either in the genus *Rhaphiodon* (see, for example, Müller & Troschel, 1844, p. 93; Géry, 1977, p. 302; Géry & Poivre, 1979; Mendes dos Santos, Jégu & Merona, 1984, p. 40; Galvis, Mojica & Rodríguez, 1989, p. 122; and Taphorn, 1992, pp. 436–439) or in *Cynodon* (see Valenciennes, 1849, p. 329; Kner, 1859, p. 54; and Günther, 1864, p. 358). When, as has been more often the case, they are placed in different genera, *vulpinus* is placed in *Rhaphiodon*

and *gibbus* in the genus *Cynodon* (see Fowler, 1906, p. 467, 1950, p. 330, 1975, p. 277; Eigenmann, 1910, p. 444; Jordan, 1923, p. 134; Eigenmann & Allen, 1942, p. 271; Nelson, 1949; Schultz, 1950, p. 47; Lowe McConnel, 1964, p. 110; Nielsen, 1974, p. 45; Howes, 1976, p. 207; Lesiuk & Lindsey, 1978; Goulding, 1980, p. 184; Géry, 1986, p. 63; Ortega & Vari, 1988, p. 10; Ferreira, Mendes dos Santos & Jégu, 1988, p. 344; Goulding, Carvalho & Ferreira, 1988, p. 127; Barriga, 1991, p. 30; Planquette, Keith & Le Bail, 1996, p. 212; Lucena & Menezes, 1998 and Toledo-Piza, 2000).

8. Our interpretations and conclusions, based on the facts cited above and the Code, are as follows:

(a) Cuvier wrongly considered *Cynodon vulpinus* to be the same species as *Hydrocyon scomberoides*, as shown (see para. 4 above) by the word 'ou' [or] in his footnote. *C. gibbus* was listed as an additional species to be included in the *scomberoides* group, but, as it was not accompanied by a description and Spix's plate had not then been published, the name *gibbus* is not available from Cuvier's work.

(b) The generic and specific names of *Cynodon vulpinus* were published by Cuvier as synonyms (of *Hydrocyon scomberoides*), but because they were used as valid by many authors prior to 1961 (see paras. 6 and 7 above) they became retrospectively available from Cuvier (1829) when Article 11.6.1 was introduced into the Code in 1964 (then as Article 11d). The type species of *Cynodon* Cuvier is *C. vulpinus* (Article 67.12). However, the name *Cynodon vulpinus* has rarely been attributed to Cuvier and we propose (para. 10 below) that *Cynodon* should be attributed to Spix in Spix & Agassiz (1829) and *vulpinus* should be attributed to Spix & Agassiz jointly: it appeared in the text (p. 76) in combination with *Rhaphiodon* and on pl. xxvi and p. 77 in combination with *Cynodon*.

(c) The specific name *gibbus* should similarly be attributed to Spix & Agassiz jointly; it appeared in the text (p. 77) in combination with *Rhaphiodon* and on pl. xxvii and p. 78 in combination with *Cynodon*.

(d) The generic name *Rhaphiodon* was proposed by Agassiz (p. 76) as a replacement name (see para. 3 above) for Spix's *Cynodon*. This being so, under Article 67.8 *Rhaphiodon* would automatically have the same type species as *Cynodon*, but we propose that *Rhaphiodon* Agassiz should be deemed to be a distinct genus with its own type species.

(e) Because *vulpinus* has usually been placed in *Rhaphiodon* and *gibbus* in *Cynodon* (see para. 7 above), we propose that *R. vulpinus* should be designated as the type species of *Rhaphiodon* and *C. gibbus* as that of *Cynodon* (as had been designated, although invalidly, by Eigenmann, 1910, p. 444).

9. In accord with Agassiz's own first reviser action (Article 24.2 of the Code: see p. 2 of the "Conspectus Piscium Brasiliensium", published in Spix & Agassiz, 1831) and with modern usage (see para. 7 above), we propose that when their type species are considered to be congeneric the name *Rhaphiodon* should take precedence over *Cynodon*.

10. The names CYNODONTIDAE and CYNODONTINAE date from Eigenmann (1907, p. 154), the corresponding names based on *Rhaphiodon* from Travassos (1946). CYNODONTINAE (or CYNODONTIDAE) have been used more often than the corresponding names based on *Rhaphiodon*, especially in recent revisionary works (see Lucena & Menezes, 1998; Géry, Le Bail & Keith, 1999; Toledo-Piza, 2000).

11. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to suppress the following names for the purposes of both the Principle of Priority and the Principle of Homonymy:
 - (a) *Cynodon* Cuvier, 1829 and all uses of the name *Cynodon* prior to the publication of *Cynodon* Spix in Spix & Agassiz, 1829;
 - (b) *vulpinus* Cuvier, 1829, as published in the binomen *Cynodon vulpinus*, and all uses of the name *Cynodon vulpinus* prior to the publication of *Cynodon vulpinus* Spix & Agassiz, 1829;
- (2) to rule that the name *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 is to be treated as the name of a new genus and not as a replacement name for *Cynodon* Spix in Spix & Agassiz, 1829;
- (3) to rule that the generic name *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 is to be given precedence over *Cynodon* Spix in Spix & Agassiz, 1829 whenever their type species are considered to be congeneric;
- (4) to set aside all previous type species fixations for the following nominal genera:
 - (a) *Cynodon* Spix in Spix & Agassiz, 1829 and to designate *Cynodon gibbus* Spix & Agassiz, 1829 as the type species;
 - (b) *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 and to designate *Rhaphiodon vulpinus* Spix & Agassiz, 1829 as the type species;
- (5) to place on the Official List of Generic Names in Zoology the following names:
 - (a) *Cynodon* Spix in Spix & Agassiz, 1829 (gender: masculine), type species by designation under the plenary power in (4)(a) above *Cynodon gibbus* Spix & Agassiz, 1829, with the endorsement that it is not to be given priority over the name *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 whenever their type species are considered to be congeneric;
 - (b) *Rhaphiodon* Agassiz in Spix & Agassiz, 1829 (gender: masculine), type species by designation under the plenary power in (4)(b) above *Rhaphiodon vulpinus* Spix & Agassiz, 1829, with the endorsement that it is to be given precedence over the name *Cynodon* Spix in Spix & Agassiz, 1829 whenever their type species are considered to be congeneric;
- (6) to place on the Official List of Specific Names in Zoology the following names:
 - (a) *gibbus* Spix & Agassiz, 1829, as published in the binomen *Cynodon gibbus* (specific name of the type species of *Cynodon* Spix in Spix & Agassiz, 1829);
 - (b) *vulpinus* Spix & Agassiz, 1829, as published in the binomen *Rhaphiodon vulpinus* (specific name of the type species of *Rhaphiodon* Agassiz in Spix & Agassiz, 1829);
- (7) to place on the Official Index of Rejected and Invalid Generic Names in Zoology the following names:
 - (a) *Cynodon* Cuvier, 1829 (suppressed in (1)(a) above);
 - (b) *Rhaphiodontichthys* Campos, 1945 (a junior objective synonym of *Rhaphiodon* Agassiz in Spix & Agassiz, 1829);
 - (c) *Camposichthys* Travassos, 1946 (a junior objective synonym of *Cynodon* Spix in Spix & Agassiz, 1829);
- (8) to place on the Official Index of Rejected and Invalid Specific Names in Zoology the name *vulpinus* Cuvier, 1829, as published in the binomen *Cynodon vulpinus* and as suppressed in (1)(b) above.

Acknowledgements

We thank J. Atz, R. Bailey, M. Carvalho, W. Eschmeyer, C. Ferraris, D. Frost, M. Kottelat and R. Vari for discussions and/or providing helpful comments on previous drafts of this application.

References

- Barriga, R. 1991. Peces de Agua Dulce. *Politecnica. Revista de Información Técnico-Científica*, 16(3): 1–88.
- Boeseman, M. 1962. *Triodon macropterus* versus *Triodon bursarius*; an attempt to establish the correct name and authorship. *Zoologische Mededeelingen*, 38(4): 77–85.
- Campos, A.A. 1945. Contribuição ao conhecimento das espécies brasileiras do gênero *Hydrocynus* e afins. *Arquivos de Zoologia do Estado de São Paulo*, 4: 467–484.
- Cuvier, G. 1819. Sur les poissons du sous-genre *Hydrocyon*, sur deux nouvelles espèces de *Chalceus*, sur les trois nouvelles espèces de des *Serrasalmes*, et sur l'*Argentina glossodonta* de Forskahl, qui est l'*Albula gonorhynchus* de Bloch. *Mémoires du Muséum d'Histoire Naturelle, Paris*, 5: 351–379.
- Cuvier, G. 1829. *Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée*, Ed. 2, vol. 2. 406 pp. Déterville, Paris.
- Eigenmann, C.H. 1907. On further collections of fishes from Paraguay. *Annals of the Carnegie Museum*, 4(2): 110–157.
- Eigenmann, C.H. 1910. Catalogue of the fresh-water fishes of tropical and south temperate America. *Reports of the Princeton University Expeditions to Patagonia, 1896–1899*, 3(4): 375–511.
- Eigenmann, C.H. & Allen, W.R. 1942. *Fishes of Western South America*. 494 pp. University of Kentucky, Lexington.
- Eschmeyer, W.N. 1990. Appendix A. Pp. 641–667 in: *Catalog of the genera of Recent fishes*. California Academy of Sciences, San Francisco.
- Eschmeyer, W.N. (Ed.). 1998. *Catalog of fishes*. 3 vols. 2905 pp. California Academy of Sciences, San Francisco.
- Eschmeyer, W.N. & Bailey, R.M. 1990. *Catalog of the genera of Recent fishes*. 697 pp. California Academy of Sciences, San Francisco.
- Ferreira, E., Mendes dos Santos, G. & Jégu, M. 1988. Aspectos ecológicos da ictiofauna do Rio Mucajaí, na área da ilha Paredão Roraima, Brasil. *Amazoniana*, 10(3): 339–352.
- Fowler, H.W. 1906. Further knowledge of some heterognathous fishes. Part 2. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 58: 431–483.
- Fowler, H.W. 1950. Os peixes de água doce do Brasil (2a entrega). *Arquivos de Zoologia do Estado de São Paulo*, 6: 205–404.
- Fowler, H.W. 1975. A catalog of world fishes (xxiii). *Quarterly Journal of the Taiwan Museum*, 28(3–4): 277–401.
- Galvis, G., Mojica, J.I. & Rodriguez, F. 1989. *Estudio ecológico de una laguna de desborde del Río Metica, Orinoquia Colombiana*. 164 pp. Universidad Nacional de Colombia, Bogotá.
- Géry, J. 1977. *Characoids of the world*. 672 pp. TFH Publ. Inc. Neptune, New Jersey.
- Géry, J. 1986. Notes de characologie néotropical. 2. Progrès récents dans la connaissance des cynodontinés (characidés). *Revue Française d'Aquariologie, Herpétologie*, 13(3): 61–68.
- Géry, J., Le Bail, P. & Keith, P. 1999. *Cynodon meionactis* sp. n., un nouveau characidé endémique du bassin du Haut Maroni en Guyane, avec une note sur la validité du genre *Cynodon* (Teleostei: Ostariophysi: Characiformes). *Revue Française d'Aquariologie, Herpétologie*, 25: 6–9.
- Géry, J. & Poivre, C. 1979. Un curieux système d'accrochage par dents transitoires chez les jeunes *Rhaphiodon vulpinus* Agassiz (Pisces, Cypriniformes, Characidae). *Revue Française d'Aquariologie, Herpétologie*, 6(1): 1–4.
- Goulding, M. 1980. *The fishes and the forest: explorations in Amazonian natural history*. 280 pp. University of California Press, Berkeley.

- Goulding, M., Carvalho, M.L. & Ferreira, E.G. 1988. *Rio Negro, rich life in poor water*. 200 pp. SPB Academic Publishing, The Hague.
- Günther, A. 1864. Characinae. Pp. 278–380 in: *Catalogue of the fishes in the British Museum*, vol. 5. British Museum, London.
- Howes, G.J. 1976. The cranial musculature and taxonomy of characoid fishes of the tribes Cynodontini and Characini. *Bulletin of the British Museum (Natural History)*, Zoology, 29(4): 201–248.
- Jordan, D.S. 1923. A classification of fishes including families and genera as far as known. *Stanford University Publications, Biological Sciences*, 3(2): 79–243.
- Kner, R. 1859. Zur familie der Characinen. III. Folge. Der Ichthyologischen Beiträge. *Denkschriften der Akademie der Wissenschaften*, Wien, 18: 9–92.
- Kottelat, M. 1988. Authorship, dates of publication, status and types of Spix and Agassiz's Brazilian fishes. *Spixiana*, 11(1): 69–93.
- Lesiuk, T.P. & Lindsey, C.C. 1978. Morphological peculiarities in the neck-bending Amazonian characoid fish *Rhaphiodon vulpinus*. *Canadian Journal of Zoology*: 56(4): 991–997.
- Lowe McConnell, R.H. 1964. The fishes of the Rupununi savanna district of British Guiana, South America. Part 1: Ecological groupings of fish species and effects of the seasonal cycle on the fish. *Journal of the Linnean Society of London*, 45(304): 103–144.
- Lucena, C.A.S. & Menezes, N.A. 1998. A phylogenetic analysis of *Poestes* Günther and *Gilbertolus* Eigenmann with a hypothesis on the relationships of the Cynodontidae and Acestrorhynchidae (Teleostei, Ostariophysi, Characiformes). Pp. 261–278 in Malabarba, L.R., Reis, R.E., Vari, R.P., Lucena, Z.M. & Lucena, C.A.S. (Eds.), *Phylogeny and classification of Neotropical fishes*. Edipucres, Porto Alegre.
- Machado-Allison, A. 1987. *Los Peces de los llanos de Venezuela: un ensayo sobre su Historia Natural*. 144 pp. Universidad Central de Venezuela, Caracas.
- Mago-Leccia, F. 1970. *Lista de los peces de Venezuela, incluyendo un estudio preliminar sobre la ictiogeografía del país*. 283 pp. Ministerio de Agricultura e Cría, Caracas.
- Mendes dos Santos, G., Jégu, M. & Merona, B. de. 1984. *Catálogo de peixes comerciais do baixo Rio Tocantins*. 85 pp. Eletronorte, Manaus.
- Müller, J. & Troschel, F.H. 1844. Synopsis generum et specierum familiae Characinarum (prodromus descriptionis novorum generum et specierum). *Archiv für Naturgeschichte*, Berlin, 10: 81–98.
- Nelson, E.M. 1949. The swim bladder and Weberian apparatus of *Rhaphiodon vulpinus* Agassiz, with notes on some additional morphological features. *Journal of Morphology*, 84(3): 495–523.
- Nielsen, J.G. 1974. *Fish types in the Zoological Museum of Copenhagen*. 115 pp. Zoological Museum, University of Copenhagen, Denmark.
- Ortega, H. & Vari, R.P. 1986. Annotated checklist of the freshwater fishes of Peru. *Smithsonian Contributions to Zoology*, 437: 1–25.
- Planquette, P., Keith, P. & Le Bail, P.-Y. 1996. *Atlas des poissons d'eau douce de Guyane*, vol. 1. 431 pp. Muséum National d'Histoire Naturelle, Ministère de l'Environnement.
- Schultz, L.P. 1950. Review of thirteen genera of South American fishes in the subfamilies Cynodontinae, Hepsetinae and Characinae, with the description of a new *Cyrtocharax*. Pp. 44–73 in *Studies honoring T. Kinkaid*. University of Washington, Seattle.
- Spix, J.B. & Agassiz, L. 1829, 1831. *Selecta genera et species piscium quos in itinere per Brasiliam ... Collegit et pingendos curavit Dr. J.B. de Spix ... Digessit, descripsit et observationibus anatomicis illustravit Dr. L. Agassiz*. xvi, ii, 138 pp., 98 pls. Wolf, Monachii.
- Taphorn, D.C. 1992. The Characiform fishes of the Apure River Drainage, Venezuela. *Biollania*, edición especial, 4: 1–537.
- Toledo-Piza, M. 2000. The Neotropical fish subfamily Cynodontinae (Teleostei: Ostariophysi: Characiformes): a phylogenetic study and a revision of *Cynodon* and *Rhaphiodon*. *American Museum Novitates*, 3286: 1–88.
- Travassos, H. 1946. Contribuições para o conhecimento da família Characidae Gill, 1893. III. Discussão sobre os gêneros *Cynodon* Spix, 1829 e *Rhaphiodon* Agassiz, 1829, com novo

- nome de subfamilia (Classe Actinoptergii — Order Ortareophygii). *Summa Brasiliensis Biologiae*, 1: 129–141.
- Valenciennes, M.A.** 1849. Des cynodons. Pp. 323–336 in Cuvier, G. & Valenciennes, M.A., *Histoire naturelle des poissons*, vol. 22. 532 pp., 16 pls. Bertrand, Paris.
- Weitzman, S.H.** 1996. Book review. *Selecta genera et species piscium quos in itinere per Brasiliam ... Collegit et pingendos curavit Dr. J.B. de Spix ... Digessit, descripsit et observationibus anatomicis illustravit Dr L. Agassiz*. Reprint edition. *Copeia*, 1996(4): 1056–1058.
- Whitehead, J.P. & Myers, G.S.** 1971. Problems of nomenclature and dating of Spix and Agassiz's Brazilian fishes (1829–1831). *Journal of the Society for the Bibliography of Natural History*, 5(6): 478–497.
-

Comments on this case are invited for publication (subject to editing) in the *Bulletin*; they should be sent to the Executive Secretary, I.C.Z.N., c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K. (e-mail: iczn@nhm.ac.uk).